



CG012 Paediatrics

1. Key Recommendations for operational use		
1	Contact	<ul style="list-style-type: none"> Contact ScotSTAR Paediatric / EMRS team via SSD: 03333 990 222. Tertiary paediatric hospitals are Glasgow (RHC) and Edinburgh (RHSC): <ul style="list-style-type: none"> - accept patients up to their 16th birthdays
2	Age per page	<ul style="list-style-type: none"> Use the Age-per-page as a cognitive aid (Appendix 3). Use two person check of drug doses, equipment sizes and fluid volumes.
3	Airway	<ul style="list-style-type: none"> Position the head in neutral alignment in an infant / young child Use a shoulder roll for infants / babies Do not compress submental soft tissues when mask ventilating: <ul style="list-style-type: none"> - this occludes the airway Consider a two handed technique, along with an oropharyngeal airway Calculate tube length first: endobronchial intubation is likely Use most familiar laryngoscope blade, ideally a MacIntosh blade size 0-4 Use a cuffed ETT tube ETT internal diameter: age / 4 + 4 Have ETT ½ size above and below available Consider an ETT stylet for infants ETT insertion to lips: age / 2 + 12 Front of neck access: have an extremely high threshold and optimise all attempts at supraglottic airways (SGA) first. SGA will usually be successful. If proceeding to front of neck access: <ul style="list-style-type: none"> - 1-8 years : consider needle cricothyroidotomy - >8: consider surgical cricothyroidotomy
4	Breathing	<ul style="list-style-type: none"> Desaturation is quicker - assist ventilation sooner Be careful with tidal volumes when hand ventilating Give PEEP Consider inserting a nasogastric tube to decompress the stomach Use 6-8ml / kg tidal volume Use Oxylog 3000/3000+ ventilator with paediatric tubing in children 10-30kg. Consider hand ventilation in infants under 10kg



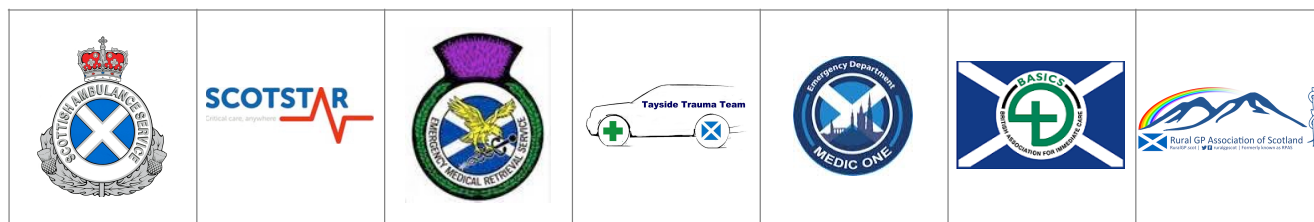
CG012 Paediatrics

5	Circulation	<ul style="list-style-type: none"> • IO: caution with sizing in small children and infants, it may be appropriate to use blue 25mm needle rather than 15mm pink in infants <1 year old. • Consider specific IO dressings to stabilise, but gauze and tape may be used. • Use tibial tuberosity as 1st choice: <ul style="list-style-type: none"> - humeral head is an acceptable alternative, especially > 8 years old • Appropriate IV fluid or blood boluses are: <ul style="list-style-type: none"> - 5 ml/kg in trauma - 10 ml/kg in severe sepsis - 5 ml/kg in DKA and congenital cardiac disease, cautiously (seek PICU advice) • Do not titrate to blood pressure, look for signs of organ perfusion <ul style="list-style-type: none"> - capillary refill, heart rate, skin colour and mental status
6	Disability	<ul style="list-style-type: none"> • Use AVPU as an assessment of conscious level • Check capillary blood glucose (BM) in all patients • With head injury, ensure adequate blood pressure to maintain cerebral perfusion • Use titrated boluses of morphine / midazolam for maintenance of anaesthesia <ul style="list-style-type: none"> - consider a propofol infusion for longer transfers in older children after discussion with the receiving PICU
7	Exposure	<ul style="list-style-type: none"> • Children lose heat quickly: careful temperature control is imperative • Abdominal organs are vulnerable to injury • Pelvic fractures rare - cut splint to size if feasible • Long bones: fold Kendrick to size
8	Weight	<ul style="list-style-type: none"> • Weight formulae: <ul style="list-style-type: none"> - 1-12 months: $0.5 \times \text{age in months} + 4$ - 1-5 years: $(2 \times \text{age in years}) + 8$ - 6-12 years: $(3 \times \text{age in years}) + 7$
9	CPR	<ul style="list-style-type: none"> • 5 rescue breaths • 15:2 chest compressions to breaths • 4 joules / kg DC shock
10	Death at scene	<ul style="list-style-type: none"> • Resuscitation should normally be continued to the nearest hospital • In certain contexts (catastrophic injury, entrapment, CYPADM form completed) it may be appropriate to perform Confirmation of Death at scene • See section 4.10 for potential decision support within NHS Lothian and NHS GG&C and guidance on process for Sudden Unexpected Death in Infancy.



CG012 Paediatrics

2. Document History			
Reference Number	CG012		
Version	1		
Writing group (Chair in bold)	David Bywater	Consultant paramedic	SAS
	Colin Donald	Emergency physician	TTT
	David Hogg	General Practitioner	RGPAS
	Richard Lyon	Emergency physician	Medic 1
	Jon McCormack	Anaesthetist	EMRS
	Savini Wijesingha	Anaesthetist	EMRS
	Mark Worrall	Anaesthetist	ScotSTAR Paediatrics
Associate Medical Director	Andrew Inglis		
Date issued	5th August 2019		
Date for review	August 2022		
Distribution	ScotSTAR	EMRS West	✓
		EMRS North	✓
		Paediatric	✓
		Neonatal	X
	Referring centres via service websites		✓
	BASICS Scotland		✓
	Medic 1		✓
	Tayside Trauma Team		✓
	Rural GPs Association of Scotland		✓
	SAS Air Ambulance Division		✓





CG012 Paediatrics

3. Scope and purpose

- Overall objectives:

The aim of this guideline is to provide specific guidance relating to the emergency management of children by non-specialist teams or individuals. The document also includes the master document for the age-per-page cognitive aid.

- Statement of intent:

This guideline is not intended to be construed or to serve as a standard of care. Adherence to guideline recommendations will not ensure a successful outcome in every case, nor should they be construed as including all proper methods of care or excluding other acceptable methods of care aimed at the same results. The ultimate judgement must be made by the appropriate healthcare professional(s) responsible for clinical decisions regarding a particular clinical procedure or treatment plan. Clinicians using this guideline should work within their skill sets and usual scope of practice.

- Specific note:

SAS policy is for the conveyance of all patients under the age of 2 to hospital. Any decision not to transport a patient under two should be carefully appraised and appropriately documented.

- Feedback:

Comments on this guideline can be sent to: scotamb.CPG@nhs.net

- Equality Impact Assessment:

Applied to the ScotSTAR Clinical Standards group processes.

- Guideline process endorsed by the Scottish Trauma Network Prehospital, Transfer and Retrieval group.





CG012 Paediatrics

4. Explanatory Statements		
4.1 Contact	Authors' recommendation	Level [Reference]
<ul style="list-style-type: none"> Contact ScotSTAR Paediatric / EMRS team via SSD: 03333 990 222. Tertiary paediatric hospitals are Glasgow (RHC) and Edinburgh (RHSC): <ul style="list-style-type: none"> accept patients up to their 16th birthdays 	Information only	
4.2 Age-per-page	Authors' recommendation	Level [Reference]
<ul style="list-style-type: none"> Use the Age-per-page as a cognitive aid (Appendix 3). <p>The 'Age Per Page' has calculated doses and equipment for RSI and resuscitation.</p> <ul style="list-style-type: none"> Use two person check of drug doses, equipment sizes and fluid volumes <p>Appendix 1 is the generic drug formulary.</p>	GPP	
4.3 Airway	Authors' recommendation	Level [Reference]
<ul style="list-style-type: none"> Position the head in neutral alignment in an infant / young child. Use a shoulder roll for infants / babies. Do not compress submental soft tissues when mask ventilating: <ul style="list-style-type: none"> this occludes the airway Consider a two handed technique, along with an oropharyngeal airway <p>In an older child, the 'sniffing the morning air' position will open the airway, as in adults. Infants have a large occiput and so adult positioning will occlude the airway. A neutral position will align the oral, pharyngeal and tracheal axes, open the airway and improve the view.</p>	Strong	Guidelines [1,2]
<ul style="list-style-type: none"> Calculate tube length first: endobronchial intubation is likely Use most familiar laryngoscope blade, ideally a MacIntosh blade size 0-4 Use a cuffed ETT tube ETT internal diameter: $\text{age} / 4 + 4$ Have ETT $\frac{1}{2}$ size above and below available Consider an ETT stylet for infants. ETT insertion to lips: $\text{age} / 2 + 12$ <p>These calculations are in the Age Per Page. Endobronchial intubation is highly likely in the emergent scenario and will result in alveolar collapse in the contralateral lung and desaturation. Confirm bilateral air entry after intubation. Unilateral air entry is more likely to be an endobronchial intubation than a pneumothorax.</p>	Strong	Guidelines [1,2]



CG012 Paediatrics

<ul style="list-style-type: none"> • <i>Front of neck access: have an extremely high threshold and optimise all attempts at supraglottic airways (SGA) first. SGA will usually be successful.</i> • <i>If proceeding to front of neck access:</i> <ul style="list-style-type: none"> - <i>1-8 years : consider needle cricothyroidotomy</i> - <i>>8: consider surgical cricothyroidotomy</i> 	Strong	Guideline [2]
---	--------	------------------

4.4 Breathing	Authors' recommendation	Level [Reference]
<ul style="list-style-type: none"> • <i>Desaturation is quicker - assist ventilation sooner</i> • <i>Be careful with tidal volumes when hand ventilating</i> • <i>Give PEEP</i> <p>Children need higher alveolar ventilation and have greater basal oxygen consumption, so desaturate quickly. They have lower functional residual capacity (FRC) and closing capacity encroaches on FRC, necessitating PEEP.</p>	GPP	
<ul style="list-style-type: none"> • <i>Consider inserting a nasogastric tube to decompress the stomach</i> 	Conditional	Guidelines [2,3]
<ul style="list-style-type: none"> • <i>Use 6-8ml / kg tidal volume</i> <p>This is derived from adult data.</p>	Conditional	1++ [4]
<ul style="list-style-type: none"> • <i>Use Oxylog 3000/3000+ ventilator with paediatric tubing in children 10-30kg.</i> • <i>Consider hand ventilation in infants under 10kg</i> <p>The Oxylog 3000 paediatric circuit is appropriate for tidal volumes 50-250ml. This will be suitable for this weight range with a tidal volume range of 6-8ml/kg. Adult tubing is suitable for tidal volumes >100ml, accordingly is suitable down to 18kg. The Oxylog 1000 is suitable for patients requiring a minute ventilation of >3 L/min so should be used with caution in children <30kg.</p>	Strong	Manufacturer's Guidelines [5,6]



CG012 Paediatrics

4.5 Circulation	Authors' recommendation	Level [Reference]
<ul style="list-style-type: none"> IO: caution with sizing in small children and infants, it may be appropriate to use blue 25mm needle rather than 15mm pink in infants <1 year old. Consider specific IO dressings to stabilise, but gauze and tape may be used. Use tibial tuberosity as 1st choice: <ul style="list-style-type: none"> humeral head acceptable alternative, especially > 8 years old <p>Blue (25mm) needles are recommended for patients >3kg and pink (15mm) for patients 3-39kg [6]. However, in the experience of the writing group, the pink (15mm) needle may not reach through soft tissue and a blue (25mm) needle is likely to be suitable for all but small babies. Note the manufacturers recommendation that 5mm (black line) should remain visible above the skin prior to drilling. Intraosseus landmarks are the same as in adults, making sure to avoid the growth plate. Padding under the knee (e.g. rolled up bandage) will help stabilize the tibia.</p>	GPP	Manufacturer's Guideline [7]
<ul style="list-style-type: none"> Appropriate IV fluid or blood boluses are: <ul style="list-style-type: none"> 5 ml/kg in trauma 10 ml/kg in severe sepsis 5 ml/kg in DKA and congenital cardiac disease, cautiously (seek PICU advice) <p>Although there are several guidelines dealing with fluid volumes, these are the recommendations from PHPLS which is probably the most pertinent.</p>	Strong	Guideline [3]
<ul style="list-style-type: none"> Do not titrate to blood pressure, look for signs of organ perfusion <ul style="list-style-type: none"> capillary refill, heart rate, skin colour and mental status <p>The cardiovascular system will compensate extremely well; blood pressure is a late marker. The circulating volume is 90mls/kg in neonates and 75-80mls/kg in children. Permissive hypotension is not validated in children: use signs of organ perfusion to target resuscitation.</p>	Strong	Guidelines [1,3]
4.6 Disability	Authors' recommendation	Level [Reference]
<ul style="list-style-type: none"> Use AVPU as an assessment of conscious level <p>AVPU: Alert, Voice, Pain, Unresponsive.</p>	Strong	Guideline [3]
<ul style="list-style-type: none"> Check capillary blood glucose (BM) in all patients <p>Children do not have significant glycogen stores so are prone to hypoglycaemia in the fasting state.</p>	Strong	Guideline [3]



CG012 Paediatrics

<ul style="list-style-type: none"> • <i>With head injury, ensure adequate blood pressure to maintain cerebral perfusion</i> <p>In head injury, in order to reduce the risk of secondary brain injury, Mean Arterial Pressure (MAP) should be maintained at greater than 50mmHg as an absolute minimum, and greater than 60mmHg in older children.</p>	Conditional	2+ [8]
<ul style="list-style-type: none"> • <i>Use titrated boluses of morphine / midazolam for maintenance of anaesthesia</i> <ul style="list-style-type: none"> - <i>consider a propofol infusion for longer transfers in older children after discussion with the receiving PICU</i> <p>Standard short term maintenance of anaesthesia in a critically ill or injured child is with cautiously titrated boluses of morphine and midazolam. For longer transfers, particularly in older children, sedation may be maintained by the use of a propofol infusion - this should be discussed with the receiving critical care unit prior to initiation</p>	GPP	

4.7 Exposure	Authors' recommendation	Level [Reference]
<ul style="list-style-type: none"> • <i>Children lose heat quickly: careful temperature control is imperative</i> <p>Large body surface area to volume ratio results in rapid heat loss.</p>	GPP	
<ul style="list-style-type: none"> • <i>Abdominal organs are vulnerable to injury</i> <p>The anatomical dimensions of the torso and soft ribs leave solid organs exposed to damage.</p>	Information only	Guideline [3]
<ul style="list-style-type: none"> • <i>Pelvic fractures rare - cut splint to size if feasible</i> <p>The pliability of the pelvis makes fractures unlikely. Use Prometheus splint and cut to size.</p>	GPP	
<ul style="list-style-type: none"> • <i>Long bones: fold Kendrick to size</i> 	GPP	

4.8 Weight	Authors' recommendation	Level [Reference]
<ul style="list-style-type: none"> • <i>Weight formulae:</i> <ul style="list-style-type: none"> - <i>1-12 months: $0.5 \times \text{age in months} + 4$</i> - <i>1-5 years: $(2 \times \text{age in years}) + 8$</i> - <i>6-12 years: $(3 \times \text{age in years}) + 7$</i> <p>Alternative, age dependent, formulas are now used in many guidelines. The doses of all commonly used drugs are in the age per page document.</p>	Information only	Guideline [1]



CG012 Paediatrics

4.9 CPR	Authors' recommendation	Level [Reference]
<ul style="list-style-type: none"> • 5 rescue breaths, • 15:2 chest compressions to breaths • 4 joules / kg DC shock <p>Note that the newborn algorithm is different to the paediatric algorithm.</p> <p>https://www.resus.org.uk/resuscitation-guidelines/resuscitation-and-support-of-transition-of-babies-at-birth/</p>	Strong	Guideline [1]
4.10 Death on scene	Authors' recommendation	Level [Reference]
<ul style="list-style-type: none"> • Resuscitation should normally be continued to the nearest hospital • In certain contexts (catastrophic injury, entrapment, CYPADM form completed) it may be appropriate to perform Confirmation of Death at scene <p>Information on CYPADM can be found in reference [10].</p>	Conditional	Guidelines [9,10]
<ul style="list-style-type: none"> • See section 4.10 for NHS Lothian and GG&C specific pathways and guidance on process for Sudden Unexpected Death in Infancy. <p>Within NHS GG&C and NHS Lothian it may be possible to transfer the patient to the respective Children's Hospital's Emergency Department after RoLE for initiation of bereavement care for the family. Where this is considered, the request should be made directly from the clinician at scene to the Paediatric ED Consultant on duty. If accepted, subsequent ambulance transfer will not involve ongoing resuscitation efforts, a standby call nor use of emergency systems / traffic exemptions during transport. This must also be cleared with the most senior Police Scotland officer on scene prior to patient transport.</p> <p>Pragmatic additional advice around the approach to the care of both the deceased infant and their family during pre-hospital care and transport is accessible within the "JRCALC" guidelines (March 2016, Page 32) [9] or at www.sudiscotland.org.uk</p>	Information only	



CG012 Paediatrics

5. References

1. Advanced Paediatric Life Support. 6th Edition.
2. Black AE et al. Development of a guideline for the management of the unanticipated difficult airway in paediatric practice. *Pediatric Anesthesia* 2015; 25: 346. (also available at <https://das.uk.com/guidelines/paediatric-difficult-airway-guidelines>)
3. Pre-hospital paediatric life support. A practical approach to emergencies. 3rd Edition, 2017.
4. The Acute Respiratory Distress Syndrome Network. Ventilation with lower tidal volumes as compared with traditional tidal volumes for acute lung injury and the acute respiratory distress syndrome. *NEJM* 2000; 342: 1301-1308.
5. Instructions for use: Oxylog3000 plus
6. Instructions for use: Oxylog1000
7. Arrow EZIO guideline: (<http://www.teleflex.com/en/usa/ezioeducation/documents/8082Rev02FDAlntraosseousInfusionSystemIFUATH.pdf>)
8. Chambers IR et al. Critical thresholds of intracranial pressure and cerebral perfusion pressure related to age in paediatric head injury. *J Neurol Neurosurg Psychiatry* 2006; 77: 234–240.
9. Brown SN et al (Eds.) UK ambulance services clinical practice guidelines 2016. Bridgwater.
10. <https://www2.gov.scot/Resource/0039/00398434.pdf>




CG012 Paediatrics

APPENDIX 1: Drug doses	
Resuscitation	
Adrenaline: Cardiac arrest	10 mcg/kg (0.1ml/kg of 1:10,000 minijet)
Adrenaline: anaphylaxis	IM: > 12 years: 500 micrograms IM (0.5 mL of 1:1000) 6 -12 years: 300 micrograms IM (0.3 mL of 1:1000) < 6 years: 150 micrograms IM (0.15 mL of 1:1000) IV: 1 mcg/kg
Glucose	2mls/kg of 10% glucose
Atropine	20mcg/kg
Anaesthesia	
Ketamine	2mg/kg
Thiopentone (status epilepticus)	2-5mg/kg
Rocuronium	1mg/kg
Suxamethonium	2mg/kg
Analgesia	
Fentanyl	1mcg/kg
Alfentanil	10mcg/kg
Morphine	0.1mg/kg
Ketamine	0.1mg/kg
Paracetamol	15mg/kg (if >10kg, dose calculation otherwise lower)
Sedation	
Midazolam	0.1mg/kg
Ketamine	0.5mg/kg
Trauma	
Tranexamic acid	15mg/kg
Antibiotics	
Ceftriaxone	50mg/kg (max 2g)
Benzylpenicillin	30mg/kg (max 1.2g)
Antiemetics	
Ondansetron	0.1mg/kg



CG012 Paediatrics


APPENDIX 2: Paediatric trauma triage tool



Scottish Ambulance Service
Taking Care to the Patient


Paediatric Trauma Triage Tool

Use this tool to triage all children **under 16 years old** who have suspected major trauma



Clinical Judgement is important and valued.

If you are concerned that your patient's triage category does not reflect their needs, you require clinical or logistical advice please contact the **Trauma Desk** directly on

 **03333 990 211**

or by airwave by placing a callback to your local area dispatcher who will arrange a callback from the Trauma Desk.

Physiological Reference Ranges*

Age	RR	Pulse
<2Y	30-40	100-160
<2-5Y	25-30	95-140
5-11Y	20-25	80-120
>12Y	15-20	60-100

*Also refer to JRCALC Age-Per-Page for more physiological reference ranges

Triage Questions

Step 1
Assess your Patient's Physiology

Does your Patient have any of the following:

- Abnormal vital signs for age* not explained by pain or distress
- Abnormal conscious level
- Catastrophic haemorrhage

Step 2
Assess your Patient's Injuries

Does your Patient have any of the following:

- Penetrating injury to head, neck, torso
- Suspected open, depressed or basal skull fracture
- Suspected spinal injury with new onset neurology
- Significant bruising to chest or abdomen
- Traumatic amputation/mangled extremity proximal to wrist/ankle
- Suspected pelvic fracture
- Multiple and/or single open long bone fracture
- Burns/scalds >20% BSA and/or facial or circumferential burns from flame

Step 3
Assess the Mechanism of Injury

Did any of the following occur:

- Traumatic death in same incident/same mechanism
- "Bull's eye" damage to windscreen or damage to "A" post (from pedestrian striking outside of vehicle)
- Ejection from motor vehicle
- Pedestrian/cyclist struck by vehicle at >20mph
- Uninterrupted fall over 2x patient's height (not bouncing down stairs)
- Bicycle handlebar injury with abdominal and/or groin pain

Step 4
Special Considerations

Are any of the following present:

- Bleeding disorder or anticoagulant treatment
- Isolated burns (lialse with trauma desk)
- Pregnancy >20 weeks
- Significant crew concern (discuss case with Trauma Desk prior to transfer)


YES

NO

Response Category


Should the airway become compromised and cannot be managed, consider conveying/diverting to the nearest locally designated Emergency Department

Major trauma centre care




Your Patient requires Major Trauma Centre (MTC) Care

- If <45 minutes from MTC = convey to MTC
- If >45 minutes from MTC = contact Trauma Desk

 If you do not think your patient requires MTC, contact Trauma Desk


Remember to pre-alert the receiving hospital via airwave if you are managing a patient triaged to MTC

Trauma unit care




Your Patient requires Trauma Unit (TU) Care

- Convey to the nearest TU, or MTC if closer
- If >45 minutes from TU/MTC contact Trauma Desk


 If you do not think your patient requires TU/MTC, contact Trauma Desk

Local



Convey your patient to the nearest Local Emergency Hospital

- Your patient can be taken to the nearest hospital with an Emergency Department, regardless of designation

 If you think your patient requires MTC, contact Trauma desk

VERSION 9 (DRAFT)



CG012 Paediatrics

APPENDIX 3: Age per page

Age neonate: 3Kg

Drugs IV	Dose	Volume
Adrenaline 1:10,000 10mcg/kg	30 mcg	0.3ml
Blood bolus 10ml/kg		30ml
Tranexamic acid 15mg/kg	45mg	0.45 ml 500mg/5ml
Glucose 10% 2ml/kg		6ml
Normal saline 10ml/kg		30ml
Ketamine-sedation 0.5mg/kg	1.5mg	0.15ml 200mg/20ml
Midazolam 0.1mg/kg	0.3mg	0.3 ml 10mg/10ml

* consider 10-fold dilution to minimise potential drug delivery errors

RSI – neonate: 3kg

Cuffed ETT size	3.0 mm	
ETT length (lips)	10 cm	
	Dose	Volume
Alfentanil – For head injury 10mcg/kg	Omit	Omit
Ketamine 2mg/kg	6 mg	0.6 ml (200mg/20ml)
Suxamethonium 2mg/kg	6mg	0.12ml* (100mg/2ml)
Morphine 0.1mg/kg	0.3mg	0.3ml (10mg/10ml)
Midazolam 0.1mg/kg	0.3mg	0.3ml (10mg/10ml)
Rocuronium 1mg/kg	3mg	0.3ml (50mg/5ml)
Atropine 20mcg/kg	100mcg	0.3ml* (3mg/10ml)
Adrenaline 1:10,000 10mcg/kg	30mcg	0.3ml (1mg/10ml)

Age 6m: 5Kg

Drugs IV	Dose	Volume
Adrenaline 1:10,000 10mcg/kg	50 mcg	0.5ml
Blood bolus 10ml/kg		50ml
Tranexamic acid 15mg/kg	75mg	0.75 ml 500mg/5ml
Glucose 10% 2ml/kg		10ml
Normal saline 10ml/kg		50ml
Ketamine-sedation 0.5mg/kg	2.5mg	0.25ml 200mg/20ml
Midazolam 0.1mg/kg	0.5mg	0.5 ml 10mg/10ml

* consider 10-fold dilution to minimise potential drug delivery errors

RSI – Age 6m: 5Kg

Cuffed ETT size	3.0 mm	
ETT length (lips)	10 cm	
	Dose	Volume
Alfentanil – For head injury 10mcg/kg	50 mcg	0.1ml* (1mg/2ml)
Ketamine 2mg/kg	10mg	1ml (200mg/20ml)
Suxamethonium 2mg/kg	10mg	0.2ml* (100mg/2ml)
Morphine 0.1mg/kg	0.5mg	0.5ml (10mg/10ml)
Midazolam 0.1mg/kg	0.5mg	0.5ml (10mg/10ml)
Rocuronium 1mg/kg	5mg	0.5ml (50mg/5ml)
Atropine 20mcg/kg	100mcg	0.3ml* (3mg/10ml)
Adrenaline 1:10,000 10mcg/kg	50mcg	0.5ml (1mg/10ml)



CG012 Paediatrics

Age 1: 10Kg

Drugs IV	Dose	Volume
Adrenaline 1:10,000 10mcg/kg	100mcg	1ml
Blood bolus 10ml/kg		100ml
Tranexamic acid 15mg/kg	150mg	1.5ml 500mg/5ml
Glucose 10% 2ml/kg		20ml
Normal saline 10ml/kg		100ml
Ketamine-sedation 0.5mg/kg	5mg	0.5ml 200mg/20ml
Midazolam 0.1mg/kg	1mg	1ml 10mg/10ml

* consider 10-fold dilution to minimise potential drug delivery errors

RSI – Age 1: 10Kg

Cuffed ETT size	4 mm	
ETT length (lips)	12.5cm	
	Dose	Volume
Alfentanil – For head injury 10mcg/kg	100 mcg	0.2ml* (1mg/2ml)
Ketamine 2mg/kg	20mg	2ml (200mg/20ml)
Suxamethonium 2mg/kg	20mg	0.4ml* (100mg/2ml)
Morphine 0.1mg/kg	1mg	1ml (10mg/10ml)
Midazolam 0.1mg/kg	1mg	1ml (10mg/10ml)
Rocuronium 1mg/kg	10mg	1ml (50mg/5ml)
Atropine 20mcg/kg	200mcg	0.6ml* (3mg/10ml)
Adrenaline 1:10,000 10mcg/kg	100mcg	1ml (1mg/10ml)

Age 2: 12Kg

Drugs IV	Dose	Volume
Adrenaline 1:10,000 10mcg/kg	120mcg	1.2ml
Blood bolus 10ml/kg		120ml
Tranexamic acid 15mg/kg	180mg	1.8ml 500mg/5ml
Glucose 10% 2ml/kg		24ml
Normal saline 10ml/kg		120ml
Ketamine-sedation 0.5mg/kg	6mg	0.6ml 200mg/20ml
Midazolam 0.1mg/kg	1.2mg	1.2ml 10mg/10ml

RSI – Age 2: 12Kg

Cuffed ETT size	4.0 mm	
ETT length (lips)	13 cm	
	Dose	Volume
Alfentanil – For head injury 10mcg/kg	120 mcg	0.2ml (1mg/2ml)
Ketamine 2mg/kg	24mg	2.4ml (200mg/20ml)
Suxamethonium 2mg/kg	24mg	0.5ml (100mg/2ml)
Morphine 0.1mg/kg	1.2mg	1.2ml (10mg/10ml)
Midazolam 0.1mg/kg	1.2mg	1.2ml (10mg/10ml)
Rocuronium 1mg/kg	12mg	1.2ml (50mg/5ml)
Atropine 20mcg/kg	240mcg	0.8ml (3mg/10ml)
Adrenaline 1:10,000 10mcg/kg	120mcg	1.2ml (1mg/10ml)



CG012 Paediatrics

Age 3: 14Kg

Drugs IV	Dose	Volume
Adrenaline 1:10,000 10mcg/kg	140mcg	1.4ml
Blood bolus 10ml/kg		140ml
Tranexamic acid 15mg/kg	210mg	2.1ml 500mg/5ml
Glucose 10% 2ml/kg		28ml
Normal saline 10ml/kg		140ml
Ketamine-sedation 0.5mg/kg	7mg	0.7ml 200mg/20ml
Midazolam 0.1mg/kg	1.4mg	1.4ml 10mg/10ml

RSI – Age 3: 14Kg

Cuffed ETT size	4.0 mm	
ETT length (lips)	13.5 cm	
	Dose	Volume
Alfentanil – For head injury 10mcg/kg	140 mcg	0.3ml (1mg/2ml)
Ketamine 2mg/kg	28mg	2.8ml (200mg/20ml)
Suxamethonium 2mg/kg	28mg	0.55ml (100mg/2ml)
Morphine 0.1mg/kg	1.4mg	1.4ml (10mg/10ml)
Midazolam 0.1mg/kg	1.4mg	1.4ml (10mg/10ml)
Rocuronium 1mg/kg	14mg	1.4ml (50mg/5ml)
Atropine 20mcg/kg	280mcg	0.9ml (3mg/10ml)
Adrenaline 1:10,000 10mcg/kg	140mcg	1.4ml (1mg/10ml)

Age 4: 16Kg

Drugs IV	Dose	Volume
Adrenaline 1:10,000 10mcg/kg	160mcg	1.6ml
Blood bolus 10ml/kg		160ml
Tranexamic acid 15mg/kg	240mg	2.4ml 500mg/5ml
Glucose 10% 2ml/kg		32ml
Normal saline 10ml/kg		160ml
Ketamine-sedation 0.5mg/kg	8mg	0.8ml 200mg/20ml
Midazolam 0.1mg/kg	1.6mg	1.6ml 10mg/10ml

RSI – Age 4: 16Kg

Cuffed ETT size	5.0 mm	
ETT length (lips)	14 cm	
	Dose	Volume
Alfentanil – For head injury 10mcg/kg	160 mcg	0.3ml (1mg/2ml)
Ketamine 2mg/kg	32mg	3.2ml (200mg/20ml)
Suxamethonium 2mg/kg	32mg	0.6ml (100mg/2ml)
Morphine 0.1mg/kg	1.6mg	1.6ml (10mg/10ml)
Midazolam 0.1mg/kg	1.6mg	1.6ml (10mg/10ml)
Rocuronium 1mg/kg	16mg	1.6ml (50mg/5ml)
Atropine 20mcg/kg	320mcg	1.1ml (3mg/10ml)
Adrenaline 1:10,000 10mcg/kg	160mcg	1.6ml (1mg/10ml)



CG012 Paediatrics

Age 5: 18Kg

Drugs IV	Dose	Volume
Adrenaline 1:10,000 10mcg/kg	180mcg	1.8ml
Blood bolus 10ml/kg		180ml
Tranexamic acid 15mg/kg	270mg	2.7ml 500mg/5ml
Glucose 10% 2ml/kg		36ml
Normal saline 10ml/kg		180ml
Ketamine-sedation 0.5mg/kg	9mg	0.9ml 200mg/20ml
Midazolam 0.1mg/kg	1.8mg	1.8ml 10mg/10ml

RSI – Age 5: 18Kg

Cuffed ETT size	5.0 mm	
ETT length (lips)	14.5 cm	
	Dose	Volume
Alfentanil – For head injury 10mcg/kg	180 mcg	0.35ml (1mg/2ml)
Ketamine 2mg/kg	36mg	3.6ml (200mg/20ml)
Suxamethonium 2mg/kg	36mg	0.7ml (100mg/2ml)
Morphine 0.1mg/kg	1.8mg	1.8ml (10mg/10ml)
Midazolam 0.1mg/kg	1.8mg	1.8ml (10mg/10ml)
Rocuronium 1mg/kg	18mg	1.8ml (50mg/5ml)
Atropine 20mcg/kg	360mcg	1.2ml (3mg/10ml)
Adrenaline 1:10,000 10mcg/kg	180mcg	1.8ml (1mg/10ml)

Age 6: 25Kg

Drugs IV	Dose	Volume
Adrenaline 1:10,000 10mcg/kg	250mcg	2.5ml
Blood bolus 10ml/kg		250ml
Tranexamic acid 15mg/kg	375mg	3.8ml 500mg/5ml
Glucose 10% 2ml/kg		50ml
Normal saline 10ml/kg		250ml
Ketamine-sedation 0.5mg/kg	13mg	1.3ml 200mg/20ml
Midazolam 0.1mg/kg	2.5mg	2.5ml 10mg/10ml

RSI – Age 6: 25Kg

Cuffed ETT size	5.0 mm	
ETT length (lips)	15 cm	
	Dose	Volume
Alfentanil – For head injury 10mcg/kg	250 mcg	0.5ml (1mg/2ml)
Ketamine 2mg/kg	50mg	5ml (200mg/20ml)
Suxamethonium 2mg/kg	50mg	1ml (100mg/2ml)
Morphine 0.1mg/kg	2.5mg	2.5ml (10mg/10ml)
Midazolam 0.1mg/kg	2.5mg	2.5ml (10mg/10ml)
Rocuronium 1mg/kg	25mg	2.5ml (50mg/5ml)
Atropine 20mcg/kg	500mcg	1.7ml (3mg/10ml)
Adrenaline 1:10,000 10mcg/kg	250mcg	2.5ml (1mg/10ml)



CG012 Paediatrics

Age 7: 28Kg

Drugs IV	Dose	Volume
Adrenaline 1:10,000 10mcg/kg	280mcg	2.8ml
Blood bolus 10ml/kg		280ml
Tranexamic acid 15mg/kg	420mg	4.2ml 500mg/5ml
Glucose 10% 2ml/kg		56ml
Normal saline 10ml/kg		280ml
Ketamine-sedation 0.5mg/kg	14mg	1.4ml 200mg/20ml
Midazolam 0.1mg/kg	2.8mg	2.8ml 10mg/10ml

RSI – Age 7: 28Kg

Cuffed ETT size	6.0 mm	
ETT length (lips)	15.5 cm	
	Dose	Volume
Alfentanil – For head injury 10mcg/kg	280 mcg	0.55ml (1mg/2ml)
Ketamine 2mg/kg	56mg	5.6ml (200mg/20ml)
Suxamethonium 2mg/kg	56mg	1.1ml (100mg/2ml)
Morphine 0.1mg/kg	2.8mg	2.8ml (10mg/10ml)
Midazolam 0.1mg/kg	2.8mg	2.8ml (10mg/10ml)
Rocuronium 1mg/kg	28mg	2.8ml (50mg/5ml)
Atropine 20mcg/kg	560mcg	1.9ml (3mg/10ml)
Adrenaline 1:10,000 10mcg/kg	280mcg	2.8ml (1mg/10ml)

Age 8: 31Kg

Drugs IV	Dose	Volume
Adrenaline 1:10,000 10mcg/kg	310mcg	3.1ml
Blood bolus 10ml/kg		310ml
Tranexamic acid 15mg/kg	465mg	4.6ml 500mg/5ml
Glucose 10% 2ml/kg		62ml
Normal saline 10ml/kg		310ml
Ketamine-sedation 0.5mg/kg	16mg	1.6ml 200mg/20ml
Midazolam 0.1mg/kg	3.1mg	3.1ml 10mg/10ml

RSI – Age 8: 31Kg

Cuffed ETT size	6.0 mm	
ETT length (lips)	16 cm	
	Dose	Volume
Alfentanil – For head injury 10mcg/kg	310 mcg	0.6ml (1mg/2ml)
Ketamine 2mg/kg	62mg	6.2ml (200mg/20ml)
Suxamethonium 2mg/kg	62mg	1.2ml (100mg/2ml)
Morphine 0.1mg/kg	3.1mg	3.1ml (10mg/10ml)
Midazolam 0.1mg/kg	3.1mg	3.1ml (10mg/10ml)
Rocuronium 1mg/kg	31mg	3.1ml (50mg/5ml)
Atropine 20mcg/kg	600mcg	2.0ml (3mg/10ml)
Adrenaline 1:10,000 10mcg/kg	310mcg	3.1ml (1mg/10ml)



CG012 Paediatrics

Age 9: 34Kg

Drugs IV	Dose	Volume
Adrenaline 1:10,000 10mcg/kg	340mcg	3.4ml
Blood bolus 10ml/kg		340ml
Tranexamic acid 15mg/kg	510mg	5.1ml 500mg/5ml
Glucose 10% 2ml/kg		68ml
Normal saline 10ml/kg		340ml
Ketamine-sedation 0.5mg/kg	17mg	1.7ml 200mg/20ml
Midazolam 0.1mg/kg	3.4mg	3.4ml 10mg/10ml

RSI – Age 9: 34Kg

Cuffed ETT size	6.0 mm	
ETT length (lips)	16.5 cm	
	Dose	Volume
Alfentanil – For head injury 10mcg/kg	340 mcg	0.7ml (1mg/2ml)
Ketamine 2mg/kg	68mg	6.8ml (200mg/20ml)
Suxamethonium 2mg/kg	68mg	1.4ml (100mg/2ml)
Morphine 0.1mg/kg	3.4mg	3.4ml (10mg/10ml)
Midazolam 0.1mg/kg	3.4mg	3.4ml (10mg/10ml)
Rocuronium 1mg/kg	34mg	3.4ml (50mg/5ml)
Atropine 20mcg/kg	600mcg	2.0ml (3mg/10ml)
Adrenaline 1:10,000 10mcg/kg	340mcg	3.4ml (1mg/10ml)

Age 10: 37Kg

Drugs IV	Dose	Volume
Adrenaline 1:10,000 10mcg/kg	370mcg	3.7ml
Blood bolus 10ml/kg		370ml
Tranexamic acid 15mg/kg	555mg	5.5ml 500mg/5ml
Glucose 10% 2ml/kg		72ml
Normal saline 10ml/kg		370ml
Ketamine-sedation 0.5mg/kg	19mg	1.9ml 200mg/20ml
Midazolam 0.1mg/kg	3.7mg	3.7ml 10mg/10ml

RSI – Age 10: 37Kg

Cuffed ETT size	6.0 mm	
ETT length (lips)	17 cm	
	Dose	Volume
Alfentanil – For head injury 10mcg/kg	370 mcg	0.75ml (1mg/2ml)
Ketamine 2mg/kg	72mg	7.2ml (200mg/20ml)
Suxamethonium 2mg/kg	72mg	1.4ml (100mg/2ml)
Morphine 0.1mg/kg	3.7mg	3.7ml (10mg/10ml)
Midazolam 0.1mg/kg	3.7mg	3.7ml (10mg/10ml)
Rocuronium 1mg/kg	37mg	3.7ml (50mg/5ml)
Atropine 20mcg/kg	600mcg	2.0ml (3mg/10ml)
Adrenaline 1:10,000 10mcg/kg	370mcg	3.7ml (1mg/10ml)



CG012 Paediatrics

Age 11: 40Kg

Drugs IV	Dose	Volume
Adrenaline 1:10,000 10mcg/kg	400mcg	4.0ml
Blood bolus 10ml/kg		400ml
Tranexamic acid 15mg/kg	600mg	6.0ml 500mg/5ml
Glucose 10% 2ml/kg		80ml
Normal saline 10ml/kg		400ml
Ketamine-sedation 0.5mg/kg	20mg	2.0ml 200mg/20ml
Midazolam 0.1mg/kg	4.0mg	4.0ml 10mg/10ml

RSI – Age 11: 40Kg

Cuffed ETT size	7.0 mm	
ETT length (lips)	17.5 cm	
	Dose	Volume
Alfentanil – For head injury 10mcg/kg	400 mcg	0.8ml (1mg/2ml)
Ketamine 2mg/kg	80mg	8.0ml (200mg/20ml)
Suxamethonium 2mg/kg	80mg	1.6ml (100mg/2ml)
Morphine 0.1mg/kg	4.0mg	4.0ml (10mg/10ml)
Midazolam 0.1mg/kg	4.0mg	4.0ml (10mg/10ml)
Rocuronium 1mg/kg	40mg	4.0ml (50mg/5ml)
Atropine 20mcg/kg	600mcg	2.0ml (3mg/10ml)
Adrenaline 1:10,000 10mcg/kg	400mcg	4.0ml (1mg/10ml)

Age 12: 43Kg

Drugs IV	Dose	Volume
Adrenaline 1:10,000 10mcg/kg	430mcg	4.3 ml
Blood bolus 10ml/kg		430ml
Tranexamic acid 15mg/kg	645mg	6.5ml 500mg/5ml
Glucose 10% 2ml/kg		86ml
Normal saline 10ml/kg		430ml
Ketamine-sedation 0.5mg/kg	22mg	2.2ml 200mg/20ml
Midazolam 0.1mg/kg	4.3mg	4.3 ml 10mg/10ml

RSI – Age 12: 43Kg

Cuffed ETT size	7.0 mm	
ETT length (lips)	18 cm	
	Dose	Volume
Alfentanil – For head injury 10mcg/kg	430 mcg	0.85 ml (1mg/2ml)
Ketamine 2mg/kg	86mg	8.6 ml (200mg/20ml)
Suxamethonium 2mg/kg	86mg	1.7 ml (100mg/2ml)
Morphine 0.1mg/kg	4.3 mg	4.3 ml (10mg/10ml)
Midazolam 0.1mg/kg	4.3 mg	4.3 ml (10mg/10ml)
Rocuronium 1mg/kg	43 mg	4.3 ml (50mg/5ml)
Atropine 20mcg/kg	600mcg	2.0ml (3mg/10ml)
Adrenaline 1:10,000 10mcg/kg	430mcg	4.3 ml (1mg/10ml)



CG012 Paediatrics

Age 13: 46Kg

Drugs IV	Dose	Volume
Adrenaline 1:10,000 10mcg/kg	460mcg	4.6 ml
Blood bolus 10ml/kg		460ml
Tranexamic acid 15mg/kg	690mg	6.9ml 500mg/5ml
Glucose 10% 2ml/kg		92ml
Normal saline 10ml/kg		460ml
Ketamine-sedation 0.5mg/kg	23mg	2.3ml 200mg/20ml
Midazolam 0.1mg/kg	4.6mg	4.6 ml 10mg/10ml

RSI – Age 13: 46Kg

Cuffed ETT size	7.0 mm	
ETT length (lips)	18.5 cm	
	Dose	Volume
Alfentanil – For head injury 10mcg/kg	460 mcg	0.9 ml (1mg/2ml)
Ketamine 2mg/kg	92mg	9.2 ml (200mg/20ml)
Suxamethonium 2mg/kg	92mg	1.8 ml (100mg/2ml)
Morphine 0.1mg/kg	4.6 mg	4.6 ml (10mg/10ml)
Midazolam 0.1mg/kg	4.6 mg	4.6 ml (10mg/10ml)
Rocuronium 1mg/kg	46 mg	4.6 ml (50mg/5ml)
Atropine 20mcg/kg	600mcg	2.0ml (3mg/10ml)
Adrenaline 1:10,000 10mcg/kg	460mcg	4.6 ml (1mg/10ml)

APPENDIX 4

Paediatric Emergency Intubation Equipment: Quick Reference Guide

	Neonate	6m	1y	2y	3y	4y	5y	6y	7y	8y	9y	10y	11y	12y	13y
Mac Blade	1	1	2	2	2	2	2	3	3	3	3	3	3	3	3
Mac Handle	Thin	Thin	Thin	Thin	Thin	Thin	Thin	Adult	Adult	Adult	Adult	Adult	Adult	Adult	Adult
LMA	1	1½	1½	2	2	2	2	2½	2½	3	3	3	3	3	3
Filter/Catheter	Small	Small	Small	Small	Small	Small	Small	Large	Large	Large	Large	Large	Large	Large	Large
Bougie	5	5	5	5	5	10	10	10	10	10	10	15	15	15	15